

[10pt,emulateapj]article

December 15 2000 January 22 2001

document

Constraints on the warm dark matter model from gravitational lensing

Yan-Jie Xue and Xiang-Ping Wu

Beijing Astronomical Observatory, Chinese Academy of Sciences, Beijing 100012; and National Astronomical Observatories, Chinese Academy of Sciences, Beijing 100012; China

abstract Formation of sub-galactic halos is suppressed in warm dark matter (WDM) model due to thermal motion of WDM particles. This may provide a natural resolution to some puzzles in standard cold dark matter (CDM) theory such as the cusped density profiles of virialized dark halos and the overabundance of low mass satellites. One of the observational tests of the WDM model is to measure the gravitationally lensed images of distant quasars below sub-arcsecond scales. In this *Letter*, we report a comparison of the lensing probabilities of multiple images between CDM and WDM models using a singular isothermal sphere model for the mass density profiles of dark halos and the Press-Schechter mass function for their distribution and cosmic evolution. It is shown that the differential probability of multiple images with small angular separations down to ~ 10 milliarcseconds should allow one to set useful constraints on the WDM particle mass. We discuss briefly the feasibility and uncertainties of this method in future radio surveys (e.g. VLBI) for gravitational lensing.

